INFORMATIONAL LEAFLET NO. 157

THE KING CRAB FISHERIES OF THE ALASKA PENINSULA AND ALEUTIAN ISLANDS, 1970-1971

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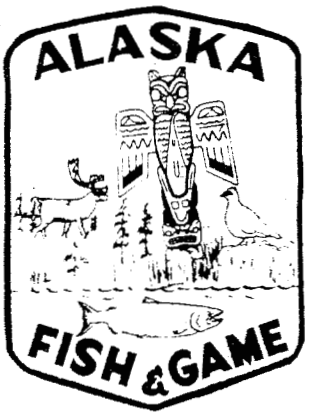

JUNE 1972

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (Continued)

THE KING CRAB FISHERIES OF THE ALASKA PENINSULA AND ALEUTIAN ISLANDS, 1970-1971

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INTRODUCTION

Alaska king crab fisheries are separated into a series of vessel registration areas, with the exception of the eastern Bering Sea. Vessels may fish in only one registration area annually, but may also fish the Bering Sea non-registration area when not engaged in other fisheries (McMullen and Yoshihara, 1972).

The king crab fisheries of the Alaska Peninsula and Aleutian Islands are located within Registration Areas "LM", "O" and "R" (Figure 1). Research on king crabs has been conducted in these areas since July, 1969. Those research objectives, carried on in cooperation with the area management biologists, dealt with the operation of the commercial fisheries and the annual condition of the exploited king crab stocks. Fishery statistics and data pertaining to crab stock condition were gathered during the course of the fishing seasons by biologists stationed at landing sites. The data were later compiled by research and management biologists in an annual report, of which this document is second in a series. The report of the 1969-1970 king crab seasons in Areas "LM", "O" and "R" was authored by McMullen and Yoshihara (1970). This year, as planned, the report is a joint research-management effort.

Treatment of data within this report is brief and their analysis is minimal. The authors are no longer associated with the king crab fisheries, and therefore do not claim knowledge of initimate detail we once possessed.

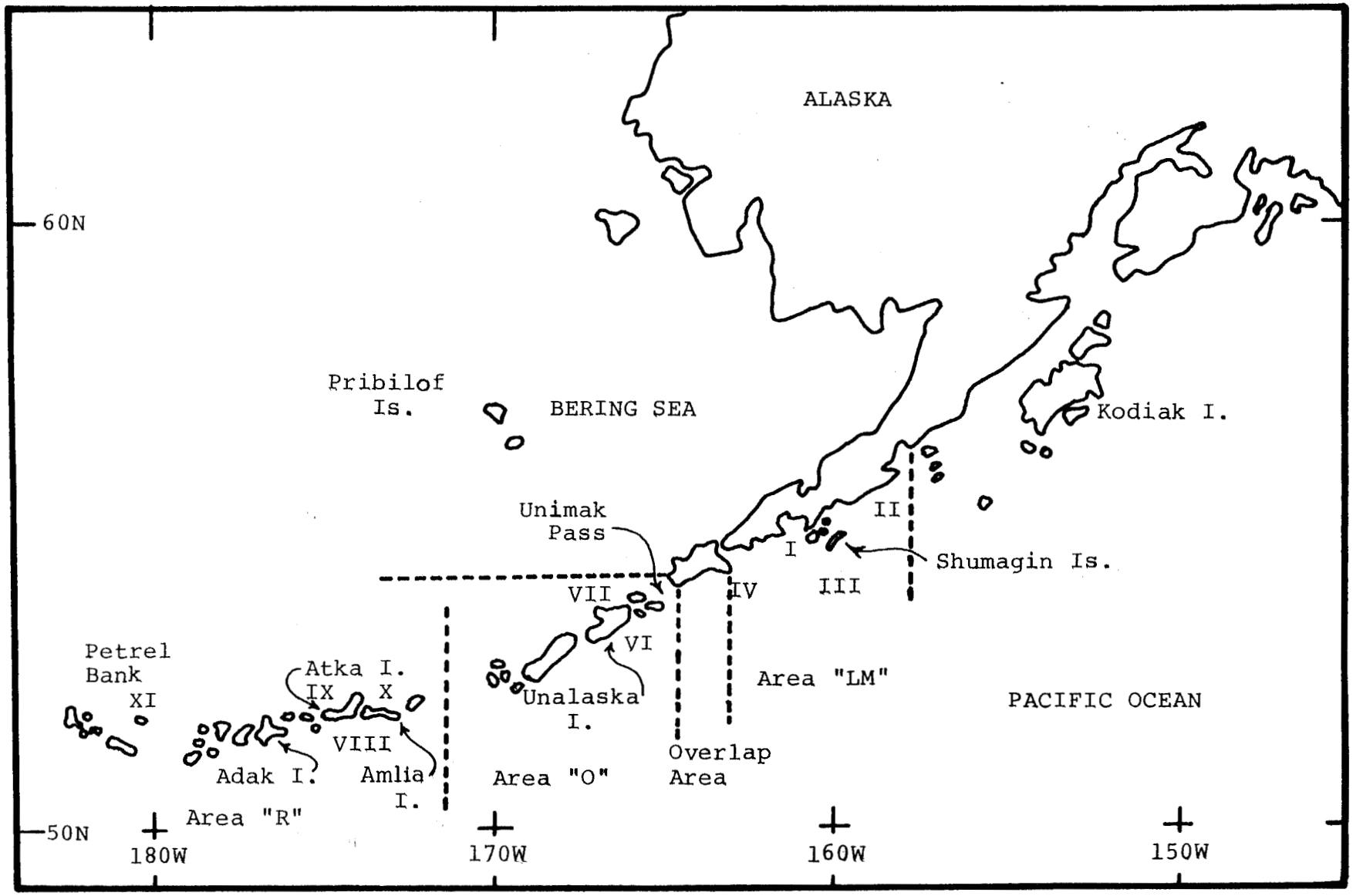

Figure 1. Location of king crab registration areas and fishing sub-areas of the Alaska Peninsula and Aleutian Islands.

However, our data are valid and should be presented to maintain the continuity of this report series. Analysis will become more critical in establishing or detecting trends in future years. However, the comparison of 2-years' data could be easily over-valued, which we intend not to do.

Description of registration areas

Fisheries discussed here are located within king crab vessel Registration Areas "LM", "O" and "R". Area "LM" encompasses the Pacific Ocean waters of the Alaska Peninsula between the boundaries of Cape Kumlik and Unimak Pass. Waters south of Unimak Island are designated the Overlap Area for the fisheries of Areas "LM" and "O" and can be fished by either fleet until the catch quota for that fleet is reached. Data presented in the summaries of the "LM" 1970-71 fishery include those crabs landed from the Overlap Area by "LM" and Area "O" boats.

Registration Area "O" is bounded by the western tip of Unimak Island and 172° W. Longitude, with a northern Bering Sea boundary of 54°36' N. Latitude. Registration Area "R" is comprised of Aleutian Island waters west of 172° W. Longitude.

Each registration area was further divided into sub-areas for the purposes of data compilation and analysis. Sub-areas consist of a group of statistical areas (Table 1) normally used for reporting catches. Boundaries of sub-areas were chosen through a knowledge of fleet distribution, presence of natural barriers to crab migration (hence stock mixing) or apparent geographical separation of major groups of crabs. However, these factors were not weighted equally when defining each sub-area.

Fishery regulations

The Alaska Board of Fish and Game initiated king crab catch quotas with the 1970-1971 fishing season. Quotas were; 4 million pounds for Area "LM", 8 million pounds for Area "O", and 15 million pounds for Area "R".

Separate fishing seasons were also maintained for each registration area, although seasons were scheduled to close when quotas were obtained. The season in "LM" extended from August 15 to January 15. The season in Area "O" as well as that in the Overlap Zone extended from September 15 through February 15. Vessels registered in Area "LM" were eligible to fish the Overlap Area, providing them with an extra month's fishing following the closure of "LM". The season in the mid-Aleutians (Area "R") extended from

Table 1. Designation of fishing sub-areas of Alaska Peninsula and Aleutian Islands.

Fishing area	Sub-area number	Statistical area
ALASKA PENINSULA		
Shumagin Is. mainland	I	281-34,35,36; 283-61,62,63,64,70,80,90
East Shumagin Is.	II	282-10,11,12,13,21,33,23,24,25,26 286-21,22
West Shumagin Is.	III	283-11,12,20,31,32,33,34,41,42,51,52 286-32,33,34,35,36; 311-60; 284-60
Sanak I.	IV	283-10,30; 286-30,31,37
Davidson Bank-Unimak I.	V	284-10,20,30,40,50,71,72 286-41,42,43,44,45,46
EASTERN ALEUTIANS		
Pacific Ocean waters	VI	302-18-19,50,51,60,70,80,90; 303-21,22,23,35 362-11,12,16,52,61,71,76,81,86,91,96
Bering Sea waters	VII	302-16,17,21,22,23,24,25,30,31 303-10,31,32; 353-30; 304-12
MID-ALEUTIANS		
Atka-Amlia Is. Pacific Ocean	VIII	305-15,21,22,31,32; 306-16,20,30 365-33,34; 366-10,20,30
Atka I., Bering Sea	IX	305-41,42,51; 306-11; 307-12
Amlia I., Bering Sea	X	305-11,52,53
Petrel Bank	XI	308-41,42,43,45,46; 358-41,46,47,48,71

November 1 to March 31. All seasons were based on the department's best estimates of crab condition and molting and mating behavior. The closed periods are designed to protect soft-shell crabs of both sexes during late summer and also crabs schooling to molt and mate during late winter and spring.

Minimum legal size for king crabs was maintained at 7 inches carapace width for the 1970-71 season.

METHODS

Data presented here were derived from several sources. Statistics concerning geographical locations fished, numbers of pots lifted and pounds landed were obtained from fish tickets completed by crab buyers. These data were compiled monthly from sub-area totals. Average weights of individual crabs, carapace size distributions and composition of new and old-shell crabs in the commercial catches were obtained by Fish and Game personnel while vessels were unloading crabs.

Crab carapace lengths and exoskeletal age were obtained by sampling 50 crabs per landing. Summarized length-frequencies presented here are weighted by relative monthly production.

Average weights were obtained by counting numbers of crabs being placed in unloading buckets, and then dividing crab numbers into bucket weights recorded by the crab buyers. Numbers of crabs landed were then estimated by dividing monthly average weights for crabs for each sub-area by month.

RESULTS

Fishery statistics for the 1970-1971 fisheries are discussed in terms of vessels, landings, catch, and catch per unit effort.

Landings

Vessels in the Shumagin Islands (Area "LM") complete their highest number of landings during the fall months (Table 2) after which declining landings reflected foul weather and general unavailability of king crabs on

Table 2. King crab landings for the 1970-1971 fisheries of the Alaska Peninsula and Aleutian Islands.

Fishing area	King crab landings by month						
	September	October	November	December	January	February	March
Shumagin Is.	100	73.5	62.5	61	35	7	--
East Aleutians 1/	14	73.5	69.5	72	39	--	--
Mid-Aleutians	--	--	63.0	80	76	73	86
Total	114	147.0	195.0	213	150	80	86

1/ Late August landings included with total for September.

Table 3. Numbers of vessels and landings associated with the king crab fisheries of the Alaska Peninsula and Aleutian Islands during two consecutive fishing seasons.

Fishing area	Vessels numbers		Landings numbers	
	1969-70	1970-71	1969-70	1970-71
Shumagin Is. (Area LM)	33	25	415	339
Eastern Aleutians (Area O)	41	32	375	268
Mid-Aleutians (Area R)	38	35	435	378
Total	112	92	1,225	985

inshore grounds. Landings in the eastern Aleutians (Area "O") and the mid-Aleutians (Area "R") generally increased toward late season, which appeared to be periods when commercial crabs were most available. Landings in Area "O" remained at about 70 per month from October through December. The January decline to 39 landings reflected a mid-month closure of the fishery. Area "R" landings reached a high of 86 in March, after ranging between 63 and 80 per month for the preceding 4 months.

Two-year comparison of vessels and landings

One hundred-twelve vessels fished in the three king crab registration areas of the Alaska Peninsula and Aleutian Islands during the 1969-1970 season (Table 3). This number was reduced to 92 vessels during the 1970-1971 season. The major reductions in fleet size occurred in Areas "LM" and "O", while registrations in Area "R" only decreased by three, for a total of 35 vessels during the 1970-1971 season.

Landings correspondingly declined from 1,225 to 985 between the 2 fishing years, although average yearly landings decreased only 0.2 to 10.7 landings per vessel during the 1970-1971 season.

Pot lifts

Pot lifts, from fish ticket reports, were assembled by month. Effort in Area "LM" was at a relatively high level in early season as expressed by total lifts of 13,887 pots for late August and September (Table 4). Monthly lifts declined to 3,012 for the month of January. The decline throughout the season was the result of the fleet's inability to fish inclement weather.

Effort in Areas "O" and "R" maintained a relatively high level into the winter months. Pot lifts in Area "O" peaked at nearly 16,000 during the month of October. Effort in Sub-area VII increased during the winter months as crabs moved into the fishery in the vicinity of northwest Unimak Pass.

The crab fleet in Area "R" was the largest in number of vessels and average vessel size, when compared with the fleets of Areas "O" and "LM". In the mid-Aleutians, a high of 28,525 pots were pulled during February, although not less than 21,305 pots were lifted during any month the fishery operated.

Table 4. King crab pot lifts for the 1970-1971 fisheries of the Alaska Peninsula and Aleutian Islands.

Fishing area	Sub-area number	Pot lifts by month						
		September	October	November	December	January	February	March
Shumagin	I	7,494	3,754	1,711	1,165	603	--	--
Island	II	153	318	1,139	2,610	1,306	--	--
(Area LM)	III	1,751	1,516	1,667	690	209	--	--
	IV	200	234	0	365	0	--	--
	V	4,289	3,780	2,018	1,129	894	--	--
Sub-total		13,887 1/	9,602	6,535	5,959	3,012		
Eastern	VI	1,252	6,114	6,377	3,963	1,860	--	--
Aleutians	VII	2,945	9,874	8,992	10,494	4,327	--	--
(Area O)								
Sub-total		4,197	15,988	15,369	14,457	6,187		
Mid-	VIII	--	--	2,488	14,262	14,954	23,006	21,184
Aleutians	IX	--	--	12,158	9,714	4,118	3,369	3,065
(Area R)	X	--	--	6,512	867	916	965	1,400
	XI	--	--	649	2,036	1,317	1,185	70
Sub-total				21,807	26,879	21,305	28,525	25,719
Total		18,084	25,590	43,711	47,295	30,504	28,525	25,719

1/ Includes pot lifted during late August.

Total catch (pounds)

Pounds of landed king crabs appeared to coincide closely with monthly pot lifts. In Area "LM", 1,797,773 lb were landed during late August and September (Table 5). October landings were reduced to 643,496 lb after which catches continued to decline to 167,004 lb for January.

Three sub-areas were dominant in pounds of crabs produced. These were the Inshore Area (I), west Shumagins (III) and the Overlap Area (V).

Catches in Area "O" peaked during October with 3,171,631 lb, although Sub-area VII remained productive until the fishery was closed.

In Area "R", catches expanded through February, when a high of 5,350,224 lb was landed. Sub-area VIII, south of Amlia Island contributed about 4.7 million pounds of crab during that month. The quota was extended 3 million pounds, but the season closed before a total of 18 million pounds of king crabs was landed.

Catch per unit effort (CPUE)

Catch per unit effort is utilized as an indicator of the availability of commercial fishes. Through the use of this statistic it becomes apparent that total catch is not entirely dependent on fleet size, but may reflect the ability of fishing fleets to locate fish stocks or the behavior pattern of target species.

The August and September fishery in Area "LM" produced about 129.9 lb of legal king crabs per pot (Table 6). Catches then declined to 48.6 lb per pot during December then rose slightly to 55.4 lb per pot in January as the season closed. The late season increases may have been the result of the congregation and movement of crabs to shallower water and the mating grounds. A similar pattern was observed in Areas "O" and "R". Average catches in early season were 192.9 lb per pot and 124.6 lb per pot in "O" and "R" respectively. These averages declined until late season when they rose to 177.7 and 187.6 lb per pot for the two fisheries. In Area "R" CPUE fell to 88.1 lb per pot during the last 2 weeks of the season, for which an explanation is offered later in another section.

Comparison of 1969-70 and 1970-71 fisheries

Fishery data are compared for the 1969-70 and 1970-71 seasons, which is the period of time king crab research has been actively conducted in Areas "LM", "O" and "R".

Table 5. Pounds of king crabs landed during the 1970-1971 fisheries of the Alaska Peninsula and Aleutian Islands.

Fishing area	Sub-area number	Pounds of king crab by month						
		September	October	November	December	January	February	March
Shumagin	I	841,838	174,762	50,043	36,356	6,693	--	--
Island	II	11,196	17,503	32,991	94,953	17,378	--	--
(Area LM)	III	227,759	100,888	121,863	56,647	18,812	--	--
	IV	22,600	20,827	0	29,812	0	--	--
	V	694,380	329,516	203,960	190,862	124,212	--	--
Sub-total		1,797,773 1/	643,496	408,857	408,630	167,095		
Eastern	VI	242,898	1,267,985	1,016,729	579,645	401,245	--	--
Aleutians	VII	566,732	1,903,646	1,406,400	1,568,110	698,113	--	--
(Area O)								
Sub-total		809,630	3,171,631	2,423,129	2,147,755	1,099,358		
Mid-	VIII	--	--	288,899	1,723,752	2,318,938	4,710,652	1,880,997
Aleutian	IX	--	--	1,429,148	740,836	413,789	356,490	240,215
(Area R)	X	--	--	950,699	100,560	125,353	136,618	134,876
	XI	--	--	48,715	140,330	159,490	146,464	10,200
Sub-total				2,717,461	2,705,478	3,017,570	5,350,224	2,266,288
Totals		2,607,403	3,815,127	5,549,447	5,261,863	4,284,023	5,350,224	2,266,288

1/ Late August catches are included in September totals.

Table 6. Catch per unit effort of king crabs landed during the 1970-1971 fisheries of the Alaska Peninsula and Aleutian Islands.

Fishing area	Sub-area number	Monthly averages of pounds per pot						
		September	October	November	December	January	February	March
Shumagin Islands (Area LM)	I	112.3	46.6	29.2	31.2	11.1	--	--
	II	73.2	55.0	29.0	36.4	13.3	--	--
	III	130.1	66.5	73.1	82.1	90.0	--	--
	IV	113.0	89.0	0	81.7	0	--	--
	V	161.9	87.2	101.1	169.1	138.8	--	--
Grand Average 1/		129.9	67.0	62.6	48.6	55.4		
Eastern Aleutians (Area O)	VI	194.0	207.4	159.4	146.3	215.7	--	--
	VII	192.4	192.8	156.4	149.4	161.3	--	--
Grand Average 1/		192.9	198.3	157.7	148.6	177.7		
Mid-Aleutians (Area R)	VIII	--	--	116.1	120.9	155.1	204.8	88.8
	IX	--	--	117.5	76.3	100.5	105.8	78.4
	X	--	--	146.0	116.0	136.8	141.6	96.3
	XI	--	--	75.1	68.9	121.1	123.6	145.7
Grand Average 1/				124.6	100.7	141.6	187.6	88.1

1/ Grand averages independently developed.

Total pounds landed in Area "LM" decreased about 710,745 lb to 3,425,760 lb in 1970-71 (Table 7). Pot lifts during the same period decreased 12,268 to a total of 38,995 lifts for the season. Size of crabs during the latter season average 7.7 lb, which was only 0.1 lb less than those landed during the 1969-70 season. Catch per pot increased from 80.7 lb in 1969-70 to 87.9 lb in 1970-71. However, as calculated independently from average weights and total pounds landed, total numbers of crabs landed during the 1970-71 season was 444,878 or 83,426 fewer crabs than the previous year.

About 9,651,500 lb of king crabs were landed from Area "O" in 1970-71 which represented an increase in about 701,180 lb more than was taken during the previous season. At the same time numbers of pot lifts declined 16,485 to 56,198 for the latter season. Average catch increased 48.6 lb to 171.7 lb per pot. Average weight of landed creabs increased by 0.1 lb to 7.6 lb during 1970-71. Calculated numbers of crabs totaled 1,274,856 compared to a capture of 1,198,507 crabs in 1969-70. The 1970-71 catch was limited by a quota regulation, which was intended to close the fishery when 8 million pounds were landed.

Comparison of the 1969-70 and 1970-71 king crab fisheries in Area "R" was somewhat misleading, which is explained later in this report. During the 1970-71 season, catches totaled 16,057,021 lb, or 1,959,438 lb less than the previous year's production. An increase in 8,306 pot lifts to 124,235 accompanied the decrease in total catch. Catch per pot also decreased from an average of 155.4 lb for 1969-70 to 129.2 lb for 1970-71. Average weights of crabs increased by 0.2 lb to 6.6 lb during the past year, from which a total catch of 2,448,311 crabs was estimated.

The grand total catch in all three crab Registration Areas discussed here was 29,134,284 lb, or an estimated 4,168,045 king crabs. This is a slight decrease from the previous year's total of 31,102,286 lb and an estimated 4,553,738 crabs.

Exoskeletal size and age composition

Landed king crabs were measured for carapace length and age of exoskeleton throughout the entire season. Although minimum size of commercial males is measured in carapace width, biological investigators utilize the more accurate length measurement which can be easily transformed to width estimates through established conversion factors. The second observation, exoskeletal age, provides a determination of those crabs which molted and grew at the preceding opportunity.

Table 7. Comparison of statistics for two consecutive years' fisheries of the Alaska Peninsula and Aleutian Islands[1/].

Fishing area	Sub-area number	Pounds landed		Pot lifts numbers		Pounds per pot		Pounds per crab		Total crab numbers	
		1969-70	1970-71	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71
Shumagin	I	1,152,161	1,109,692	17,639	14,727	65.3	75.4	7.4	7.5	155,697	147,95
Island	II	255,449	174,021	4,541	5,526	56.3	31.5	7.9	7.7	32,335	22,60
(Area LM)	III	500,917	525,969	7,032	5,823	71.2	90.3	7.4	7.1	67,691	74,08
	IV	76,982	73,239	1,278	799	60.2	91.7	7.5	7.5	10,264	9,76
	V	2,150,996	1,542,839	20,773	12,110	103.5	127.4	8.2	8.1	262,317	190,47
Sub-total		4,136,505	3,425,760	51,263	38,985	80.7	87.9	7.8	7.7	528,304	444,87
Eastern	VI	2,847,573	3,508,502	26,683	19,566	106.7	179.3	7.4	7.2	384,807	487,29
Aleutians	VII	6,102,749	6,143,001	46,000	36,632	132.7	167.7	7.5	7.8	813,700	787,56
(Area O)											
Sub-total		8,950,322	9,651,503	72,683	56,198	123.1	171.7	7.5	7.6	1,198,507	1,274,85
Mid-	VIII	9,354,486	10,923,238	55,827	75,894	167.6	143.9	6.3	6.6	1,484,839	1,655,03
Aleutians	IX	4,960,000	3,180,478	32,684	32,424	151.8	98.1	6.3	6.4	787,302	496,95
(Area R)	X	2,172,887	1,448,106	15,365	10,660	141.4	135.8	6.8	6.7	319,542	216,13
	XI	1,529,086	505,199	12,053	5,257	126.9	96.1	6.5	6.3	235,244	80,19
Sub-total		18,016,459	16,057,021	115,929	124,235	155.4	129.2	6.4	6.6	2,826,927	2,448,31
Total		31,103,286	29,134,284	239,875	219,418	--	--	--	--	4,553,738	4,168,04

1/ All annual averages independently calculated.

Commercial male king crabs from along the mainland of Area "LM" range to about 196 mm carapace length. About 81% of crabs landed were of new-shell condition (Table 8). Crabs in that group largely represented geographical locations such as Pavlof Bay and Unga Strait. Males from the overlap zone were larger; ranging to about 208 mm carapace length. Only about 61.6% of that group were new-shell males.

Male king crabs of Area "O" were primarily new-shell. Samples from Sub-area VI and VII contained 85.4% and 89.6% new-shells, respectively. Although carapace lengths ranged upward to 202 mm, only about 1.5% of the sample was larger than 184 mm carapace length.

Commercial male king crabs of Area "R" were smaller than those of Areas "LM" and "O". Males ranged from minimum legal size to about 184 mm carapace length, with only rare occurrences of larger crabs. Crabs of Area "R" also departed from those of other Registration Areas in that percentages of old-shell crabs captured by the fishery ranged from 29.6 to 58.5% for the different sub-areas. The apparent high frequency of old-shell crabs may have resulted from spatial and food competition or some unknown cause.

Crab sizes were compared for the 1969-70 and 1970-71 seasons. Legal males from the various sub-areas of Area "LM" ranged from 158.7 mm to 164.5 mm average carapace length in 1970-71 (Table 9), with standard deviations of 9.8 and 10.3 mm. Comparable data for 1969-70 indicated average lengths of 160.3 to 162.3 mm carapace length with wider standard deviations of 11.3 and 10.8 mm, respectively (Figure 2).

Average sizes of crabs in Area "O" increased in 1970-71. These mean sizes of 161.6 and 164.4 mm carapace length and standard deviations of 9.1 and 8.7 mm describe the size composition of commercial males for the 1970-71 season. Crabs from the same sub-areas, but captured during the preceding season averaged slightly smaller; 159.0 and 161.6 mm carapace length with standard deviations of 11.6 and 10.5 mm for the samples. This indicates that the size composition of crabs became more constrictive during the 1970-71 season.

Legal males within Area "R" were of smaller average carapace length than the males of Areas "LM" and "O". These averages ranged between 153.4 mm and 160.2 mm carapace length for both seasons under discussion. Standard deviations of 1970-71 length frequency distributions fell within the range of 6.6 - 6.8 mm, whereas the range of standard deviations for the 1969-70 data was 5.5 - 9.1 mm, indicating a slightly wider size and age distribution of crabs during the earlier season.

Table 8. Relative frequency of carapace lengths for commercial king crabs landed from waters of the Alaska Peninsula and Aleutian Islands during the 1970-1071 season.

Carapace length mm	Shumagin Islands sub-areas				Eastern Aleutians sub-areas			
	I		V		VI		VII	
	shell age		shell age		shell age		shell age	
	new	old	new	old	new	old	new	old
	%		%		%		%	
142	1.1	--	--	--	1.6	0.2	0.3	--
145	5.4	0.2	0.1	--	2.3	0.5	1.7	0.2
148	9.4	1.3	1.9	1.1	7.5	1.1	2.6	0.6
151	10.3	2.0	2.6	2.5	11.0	1.5	5.6	1.1
154	11.2	1.7	4.3	4.3	10.9	2.2	9.4	1.1
157	10.3	2.1	6.9	6.1	11.0	2.4	8.3	0.4
160	9.8	2.4	7.1	4.9	10.2	2.0	8.3	1.2
163	6.1	1.7	9.2	3.9	8.8	1.6	10.0	1.7
166	5.7	1.0	8.7	3.5	5.9	1.4	7.9	1.1
169	3.7	1.8	7.0	2.9	6.6	0.3	8.9	0.7
172	2.5	1.7	5.2	2.1	3.2	0.6	9.4	0.4
175	2.0	0.6	4.4	1.5	2.7	0.5	6.5	0.3
178	1.4	0.9	1.9	0.7	1.4	--	4.9	0.2
181	1.3	0.3	1.5	0.7	1.1	0.2	3.2	0.1
184	0.3	0.4	0.5	1.2	0.7	--	1.6	0.3
187	0.3	0.3	0.2	0.5	0.2	--	0.7	0.4
190	0.2	0.2	--	0.6	--	--	0.3	0.2
193	0.1	0.1	0.1	0.6	0.1	--	--	0.1
196	--	0.1	--	0.6	--	--	--	0.3
199	--	--	--	0.4	0.2	--	--	0.1
202	--	--	--	0.3	--	0.1	--	--
205	--	--	--	--	--	--	--	--
208	--	--	--	0.1	--	--	--	--
Sub-total %	81.1	18.8	61.6	38.5	85.4	14.6	89.6	10.5
Total %	99.9		100.1		100		100.1	

Table 8. Relative frequency of carapace lengths for commercial king crabs landed from waters of the Alaska Peninsula and Aleutian Islands during the 1970-1971 season (continued).

Carapace length mm	Mid-Aleutians sub-areas							
	VIII		IX		X		XI	
	shell age		shell age		shell age		shell age	
	new	old	new	old	new	old	new	old
	%		%		%		%	
139	0.1	--	0.3	--	0.1	--	0.1	0.1
145	0.3	0.9	2.3	1.2	2.1	0.7	1.1	0.3
148	4.1	3.1	8.2	3.8	6.3	1.6	3.5	2.3
151	7.9	5.4	11.9	6.7	12.2	4.0	6.8	7.7
154	9.1	6.2	12.6	5.9	11.4	3.5	8.6	9.9
157	12.6	5.5	10.0	4.9	12.2	3.5	8.1	11.1
160	10.1	3.1	9.7	3.0	8.8	2.4	5.2	9.7
163	9.3	2.7	6.9	1.3	9.1	3.4	4.0	5.9
166	8.9	2.0	4.5	1.6	5.3	2.0	1.9	5.1
169	3.8	0.7	1.7	0.3	3.8	1.2	0.9	3.5
172	1.9	0.3	1.2	0.6	2.1	1.2	1.2	1.5
175	0.7	0.5	0.5	0.1	1.6	0.4	--	0.7
178	0.2	0.4	0.6	--	0.3	0.2	--	0.3
181	0.3	--	--	0.2	0.3	--	0.1	--
184	--	--	0.1	--	0.1	0.1	0.1	0.3
187	--	--	--	--	--	--	--	--
190	--	--	--	--	--	--	--	--
193	--	--	--	--	--	--	--	0.1
196	--	--	--	--	--	--	--	--
199	--	--	--	--	--	--	--	--
202	--	--	--	--	--	--	--	--
205	--	--	--	--	--	--	--	--
208	--	--	--	--	--	--	--	--
Sub-total %	69.3	30.8	70.5	29.6	75.7	24.2	41.6	58.5
Total %	100.1		100.1		99.9		100.1	

Table 9. Comparison of carapace length - frequency distributions for king crabs sampled in two consecutive years from the commercial fisheries of the Alaska Peninsula and Aleutian Islands.

Fishing area	Sub-area number	Fishing Year 1969-1970 Sample size number	Carapace length average mm	Carapace length range mm	Standard deviation	1970-1971 Sample size number	Carapace length average mm	Carapace length range mm	Standard deviation
Shumagin	I	1,000	160.3	139-205	11.3	1,067	158.7	141-197	9.8
Island	II, III, IV	1,000	161.8	141-205	13.4	--	--	--	--
(Area LM)	V	980	162.3	138-205	10.8	1,119	164.5	145-209	10.3
Eastern	VI	1,000	159.0	139-207	11.6	1,083	161.6	141-202	9.1
Aleutians	VII	1,000	161.6	140-208	10.5	1,044	164.4	141-199	8.7
(Area O)									
Mid-	VIII	1,000	155.0	141-192	7.1	1,001	158.4	143-178	6.8
Aleutians	IX	1,000	153.4	138-182	5.5	1,050	156.0	142-185	6.6
(Area R)	X	1,000	160.2	143-196	9.1	995	158.0	142-184	6.7
	IX	1,000	156.6	141-182	6.4	750	157.6	143-193	6.6

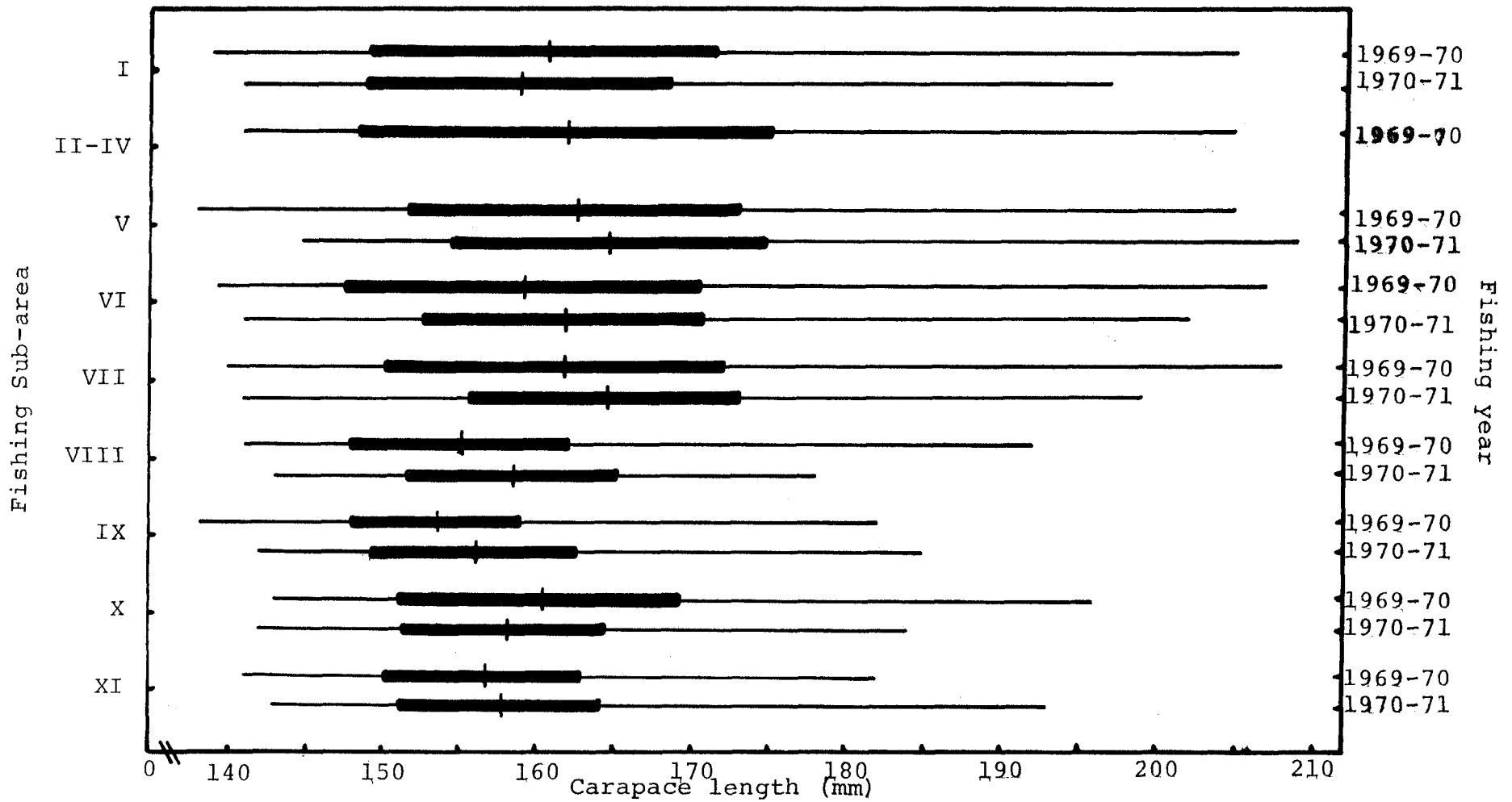

Figure 2. Comparisons of range and mean length and standard deviation of length-frequency distributions for king crabs landed from crab registration area "LM", "0" and "R" during the 1969-70 and 1970-71 fishing seasons.

DISCUSSION

The Alaska Board of Fish and Game stablished maximum catch levels for each king crab registration area, which were implemented within the 1970-71 fisheries. The quotas applied to Areas "O" and "R" (8 and 15 million pounds) represented a reduction from the 1969-70 catches, while the quota for Area "LM" (4 million pounds) approximated the previous year's catch.

Catches in Areas "LM" and "R" in 1970-71 fell below those of 1969-70, while production in Area "O" increased nearly 1 million pounds for the same period. Catches for the three registration areas in 1970-71 were; ("LM") 3,425,760 lb, ("O") 9,651,503 lb, and ("R") 16,057,021 lb. The quota was not obtained in Area "LM". This geographical area is one in which Alaska king crabs were first found in abundance. A trawl fishery existed on the inshore grounds of the Alaska Peninsula until 1958, at which time trawling for king crabs was eliminated. Trawling occurred during the spring months when crabs were schooled to molt and mate. Damage to soft-shell females was not documented, but the mortality rate of injured crabs was undoubtedly high.

The king crab fishery in Area "LM" remains depressed, and it is unfortunate that research funds have not been available with which to more thoroughly study Area "LM". Considering the life history of king crabs and the prevailing currents in the upper Gulf of Alaska, it may be that recruitment to the stocks of Area "LM" are provided by Kodiak Island stocks, which were reduced to a low level in the middle and late 1960's. The protection and recovery of the more easterly stocks may result in the re-establishment of a viable fishery in Area "LM".

The quota in Area "O" was surpassed by 1,651,503 lb for the 1970-71 season. Although no quota extension was granted above the original 8 million pounds, the catch rate was such that the entire fleet had large numbers of crabs aboard when the closure by field announcement was effected.

In Area "O", it is apparent that the fishery under the constraint of a quota, may not be exerting sufficient effort on some stocks of crabs to adequately harvest those stocks. Certainly, an early season closure of that fishery lends an unnecessary degree of protection to crabs which are not available in north Unimak Pass until mid-winter. Therefore an increase in the Area "O" quota is in order.

The established quota was reached in Area "R" prior to the season's

scheduled closure date. Based on CPUE statistics, an extension of 3 million pounds was granted by the Board of Fish and Game. However, only 1 million pounds of crabs was taken prior to the March 31 closure of the fishery in Area "R". It is believed that catches in Area "R" would have approached 18 million pounds if the mid-Aleutians fleet had exerted more effort in locating groups of crabs around Amlia and Atka Islands in late season. A large body of crabs had provided excellent fishing in February 1971, but was sufficiently harvested so that additional effort there was unprofitable. The fleet disbanded in early March and quit fishing rather than explore for more crabs.

Comparison between the fisheries and stocks of the 1969-70 and 1970-71 seasons was not attempted in detail, because 2 years' statistics do not represent a trend. However, based on knowledge of Alaska's major king crab stocks the trend is toward smaller crabs in all registration areas. Evidence indicates that size frequencies of commercial males are becoming increasingly constricted. Crabs in Area "R" are somewhat unique in that about 25 to 85% of crabs landed from the different sub-areas had not molted during the past year. This leads us to question if crabs of Area "R" are being reduced to substantially younger age groups through fishing mortality or if high natural mortality is a major contributor to an apparent reduction in longivity.

We would prefer to regulate our fisheries by means other than a quota system. However, this procedure has established a principle upon which to base research priorities. We have for some time proposed studies to determine relative abundance of sub-legal king crabs, because absolute abundance figures are impractical to obtain. These indices of abundance will, when related to annual catches, enable us to estimate the impact on future years' fisheries of size groups of young crabs growing toward legal size. In several years we should be prepared to recommend annual catch quotas on a more scientific basis than is now available.

Our knowledge of the king crab stocks is being expanded. We believe that coordinated efforts by our research and management staffs in the past 2 years have greatly enhanced our ability to manage these stocks for continued and maximized use.

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